Apollo Multiport Controllers User's Guide

Asynchronous communications for PCI-equipped Solaris™ systems:
Apollo Model 4020P

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This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: this equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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CHAPTER 1

About this Manual

The *Apollo Multiport 4020P Controller User's Guide* describes how to install and use Aurora Technologies Apollo high speed asynchronous multiport controllers for PCI bus systems.

Manual Organization

The User Manual is organized as follows:

Chapter 1, "About this Manual."	Describes purpose, audience, related documents, and document conventions for this guide.
Chapter 2, "Introducing the Apollo Multiport 4020P Controller."	Provides a technical overview of Apollo multiport controllers for SPARCs.
Chapter 3, "Installing Apollo Multiport Controller Hardware."	Describes unpacking procedures and hardware installation.
Chapter 4, "Software Installation and Configuration."	Describes installation of the device driver and the device files that are created under Solaris.
Chapter 5, "Using Vanguard Multiport Software."	Describes administration of ports and configuration of electrical interfaces on Apollo multiport controllers.

Appendix 6, “Troubleshooting.”	Describes potential installation problems, error messages, and diagnostic tools.
Chapter 7, “Warranty & Maintenance Information.”	Provides warranty and maintenance information for Aurora Technologies’ products.
Appendix A, “Cables and Connectors.”	Provides wiring diagrams and general cabling information.
Appendix B, “Product Information Worksheet.”	Provides a record of information on your Aurora Technologies hardware and software.

Who Should Use This Book

This book is a reference manual for anyone who wants to install, configure, and use Apollo serial controllers in PCI-equipped computer systems.

Related Manuals

For more information, refer to the following manuals:

- Your computer system documentation
- Your Solaris documentation
- Your peripheral’s documentation.

Document Conventions

Table 1 describes the symbolic conventions used in this guide.

TABLE 1. Conventions

Symbol	Description
screen display	Graphic text that appears on screens, menus and dialog boxes appears in sans serif font.
User input	User input values appear in **boldface**. These are characters or commands you type literally.
emphasis	Italics are used in the text for emphasis, titles, and variables.
	This caution symbol marks notes about possible damage to computer equipment or data if a procedure or process isn't followed according to instructions.
	This warning symbol marks notes about possible electrical shock to yourself or electro-static discharge damage to equipment unless you follow special instructions.
	This symbol marks special text passages that contain additional information such as notes you should know about or tips you should consider when installing, operating, or maintaining this product.

Getting Help

If you need to reach us, you can contact us by

- The Web: **`www.auroratech.com`** for product literature, phone numbers and address.
- Phone service: Mon–Fri, 8:30AM–6:00PM Eastern Time
  For faster service, have your product serial number and your system information available.

- FAX: Attn: Customer Service and Support
- Email: **support@auroratech.com**
- Mail: Attn: Customer Service and Support

Registration

To receive warranty coverage on your Aurora product, you must fill out and mail back the Aurora Warranty Registration Card that is located in the back of this manual. Phone support can only be provided after product registration is complete. Hardware and Software Maintenance Agreements can be provided for extended customer support.

Sending in this card also lets us keep you up-to-date on the complete line of Aurora Technologies' products.

If you have any questions or comments on your Aurora Technologies' product, contact our Customer Support Department at **support@auroratech.com** or your sales representative.

CHAPTER 2

Introducing the Apollo Multiport 4020P Controller

Congratulations on purchasing your Aurora Technologies Apollo Multiport™ controller. Combining on-board RISC processing, dedicated data buffers, and flow control processing, Apollo Multiport controllers off-load communications overhead from your host CPU and your network for optimum system performance.

Introducing the Apollo Multiport Controllers

The Apollo Multiport series of asynchronous PCI-bus controllers provides the performance and reliability needed for high-speed serial communications. Data transfer rates up to 230.4 kbps, full duplex, are supported. Apollo Multiport controllers are available for any SPARC-compatible system or personal computer with a PCI expansion bus, running supported releases of Solaris or Solaris x86. (See the Driver Release Note for supported Solaris releases.)

Interface options

The Apollo Multiport controllers support the RS-232 interface and are available with either DB-25 or RJ-45 connectors. RS-422 or RS-485 with DB-25 connectors are optionally available.

Introducing the Apollo Multiport Controllers

The Apollo series of PCI-Bus async controllers offers lower cost, asynchronous-only, multiport capability. It supports asynchronous data transfer rates up to 230.4 kbps, full duplex, simultaneously on all ports.

Apollo controllers support the RS-232 interface and are available with either DB-25 or RJ-45 connectors. RS-422 or RS-485 with DB-25 connectors are optionally available.

System Requirements

Aurora's Apollo Multiport controllers are designed to work with a wide range of systems running Solaris or Solaris x86. Your system must meet the following requirements:

Workstation:	Any SPARC or PC compatible
Operating System:	Solaris/Solaris x86 (See Driver Release Note for supported releases.)
CPU:	SPARC or Intel x86
Bus:	PCI
Memory:	16 Mbytes minimum
Disk Drive:	1 Mbyte free in `/opt` (Solaris)
CD-ROM Drive:	(optional)

Technical Specification Overview

Table 2 provides a technical specification overview of the Apollo Multiport controllers.

TABLE 2. Apollo Multiport Controller Specifications

Ports	4
Electrical Interface	RS-232 standard
	RS-422, RS-485 optional
Card Connector	DB-62
Connector Extensions	DB-25 DTE (male or female) RJ-45 optional
Speed full duplex, simultaneously on all ports	async: 50–230.4 kbps
Start/Stop bits	1 and 2
Data bits	5, 6, 7, or 8 bits
Interrupt Level	Assigned by OS
Flow Control	Hardware: CTS/RTS Software: XON/XOFF
Modem support	Full support all lines
Modem control	CD/DTR/DSR
I/O Buffer (per port)	128 Bytes send and receive per port
Certification	FCC Class A and CE

CHAPTER 3

Installing Apollo Multiport Controller Hardware

This chapter describes how to install Apollo Multiport hardware, and contains the following sections:

- Filling out the Product Information Worksheet
- Taking precautions before you begin
- Unpacking the Apollo Multiport hardware
- Installing the Multiport card
- Connecting peripherals to the card

Completing the Product Information Worksheet

Before beginning the installation, record the following information in Appendix B, "Product Information Worksheet."

- Apollo Multiport card serial number
- The name and model number of the system into which you have installed our product (e.g., Ultra 30).

- The version of the operating system that your system is currently running (for example, Solaris 7).

Also complete the product registration card in Chapter 7, “Warranty & Maintenance Information.” to be eligible for technical support.

Installation Overview

The following table provides an overview of how to install your Apollo Multiport controller and the Aurora device drivers.

Steps	Description	Go to
1	Unpack the multiport controller.	“Unpacking the Hardware” on page 3-4
2	Install the card in an empty slot	“Installing the Multiport Card” on page 3-5
3	Install the device drivers	Chapter 4, “Software Installation and Configuration.”
4	Set up port services for the asynchronous ports	Chapter 5, “Using Vanguard Multiport Software.”

These steps are described in detail in the following sections and chapters.

Installation Precautions

Taking the precautions described in this section should help you avoid injury or damage to your equipment.

Electrostatic discharge can damage integrated circuits on your multiport cards.

To prevent such damage from occurring, observe the following precautions during board unpacking and installation.

- Handle circuit cards only by their non-conducting edges once you have removed them from their protective antistatic bags.
- Stand on a static-dissipative mat.
- Wear a grounding strap to ensure that any accumulated electrostatic charge is discharged from your body to the ground.
- Install circuit cards as soon as you remove them from their protective anti-static packaging.
- Do not leave cards exposed after you unpack them.
- If you must put a card down, place it on anti-static packaging or on a rubber mat.

Unpacking the Hardware

Remove the multiport card from the packing box. Leave the card in its anti-static bag. Check the shipping carton contents to ensure that you have all of the required parts, as listed in Table 3.

TABLE 3. Apollo Multiport Controller Parts List

Qty.	Description
1	Multiport Card
1	Distribution cable or Breakout box
1	Serial test plug
1	Power Cord in case of RS-422 or RS-485
1	User's Manual including Device Driver CD-ROM and Registration Card.
1	Driver Release Note

Save the shipping carton and the internal packaging. If you need to ship the product back to your dealer, you must use the original carton and packaging.

Other Things You'll Need

To ensure a smooth installation, you should have the proper cabling and tools on hand.

Cabling

There are a number of cabling approaches you can use to connect devices to the new Aurora ports. If you are not sure what you need, refer to Appendix A.

Tools

You'll need the following tools to install your Apollo Multiport hardware:

- Any tools listed in your SPARC's documentation.
- A small flat-head screwdriver to make cable connections and secure mounting screws.

Installing the Multiport Card

Detailed installation procedures for PCI cards can be found in your system installation or hardware documentation. The system documentation explains how the slots are numbered and any special considerations you should note.

Electrostatic discharge and static electricity can damage integrated circuits on the PCI card and in the box.

Be sure to follow the precautions listed in your SPARC documentation.

To install the multiport card

1. Make sure the computer system is powered off.
2. Install the multiport card in the selected slot, following the instructions in your system documentation. Be sure that you secure the board in its slot with the mounting screw. (If the board isn't secured, the weight of the cable will dislodge it.)
3. Connect the distribution cable or breakout box to the multiport card.
4. Turn on and boot the SPARC.

Now you are ready to connect your peripherals.

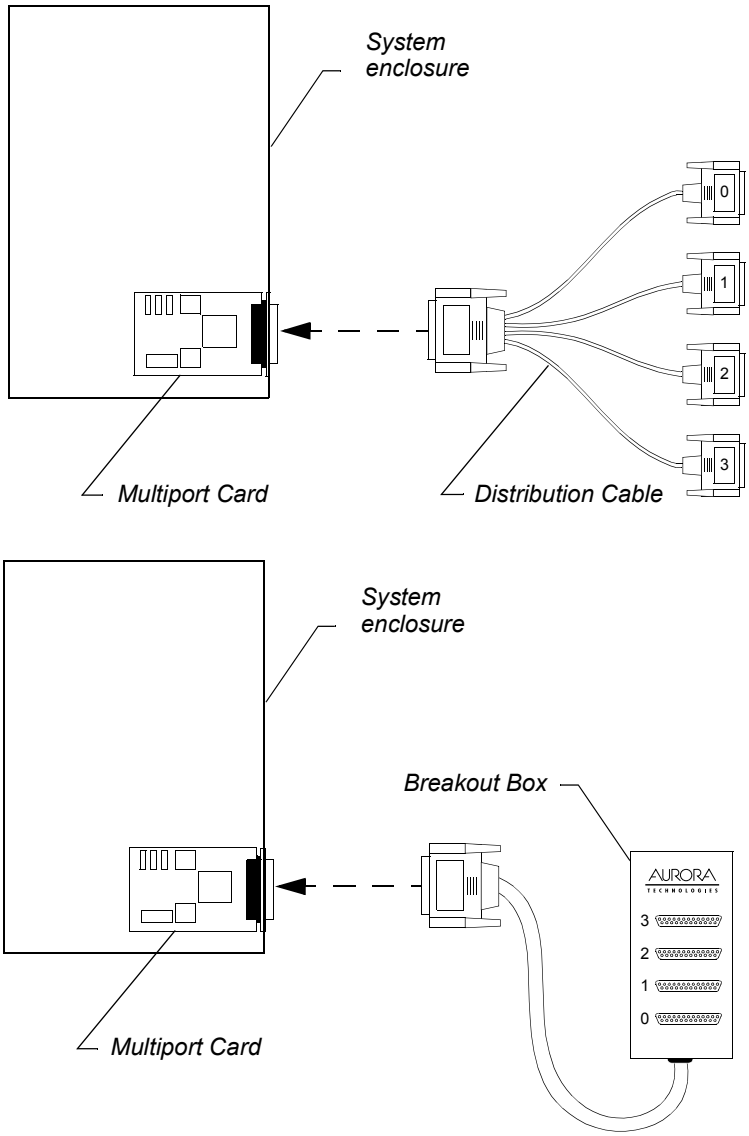

FIGURE 1. Connecting the distribution cable (or breakout box) to the Multiport card

Connecting Peripherals

Peripherals are connected to the Apollo Multiport card with user-supplied cables (See Figure 2). Detailed cabling information is provided in Appendix A. All peripheral cables *must* be shielded to ensure proper functioning of your equipment. Once you have the necessary cables, use the following procedure.

To connect a peripheral device to the expansion unit:

1. Choose the correct, shielded, peripheral cable, as shown in Figure 2.
2. Attach one end of the cable to the peripheral.
3. Attach the other end of the cable to one of the free connectors on the distribution cable or breakout box.
4. Record the slot number of the PCI interface card and the port number of the Aurora port in the *Product Information Worksheet* at the back of this manual.

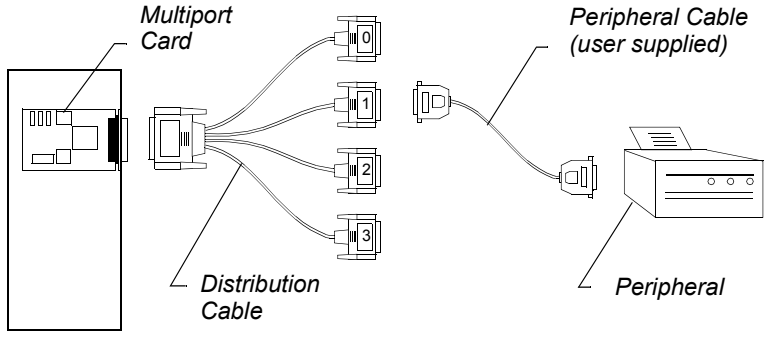

FIGURE 2. Connecting a peripheral to the distribution cable

Now you can set up the port services for the peripheral devices.

The connectors on the distribution cable are numbered to match the device names that are created when the driver software is installed. But you'll also need to know which port the peripheral is connected to when setting up its port services.

CHAPTER 4

Software Installation and Configuration

The Vanguard Multiport device drivers allow your CompactPCI-based system to communicate with various asynchronous serial devices (such as printers, terminals, or modems) through the Aurora ports.

A CD-ROM containing device driver software and an installation script is shipped with your Apollo Multiport board. The Release Note accompanying the device driver CD-ROM provides detailed driver installation procedures.

This chapter describes the following:

- Installing device driver software
- Creating Asynchronous device file names
- Setting up Asynchronous port services

Before performing the software installation procedures, you should have installed the Vanguard Multiport card.

Installing the Device Driver Software

After you have installed your new Aurora hardware, follow the device driver software installation procedures in the Driver Release Note to install the driver.

You only need to install the driver once, even if you are installing more than one Apollo Multiport serial card. One device driver can support up to sixteen serial cards.

After you have installed the driver software, proceed with the setup and configuration procedures that follow in this chapter.

Free Driver and Release Note Downloads

You can download the latest versions of all Aurora drivers and release notes from the Aurora Technologies web site, **`www.auroratech.com`**. Use the following procedure

To download from the Aurora web site

1. Using your favorite browser, go to www.auroratech.com.
2. Click on **Support**.
3. Click on **Drivers**.
4. Follow the instructions provided on the displayed web page.

Asynchronous Device File Names

Each serial port connected to terminals, modems, etc., needs to be identified by one or more device files, depending on the intended use of the port. Device file naming conventions vary, depending on the device's use.

The system automatically creates Solaris device files for each new port on the Vanguard Multiport card. Table 4 shows the device files created for two four-port cards installed on the same system.

The format for device file names is defined as shown in Figure 3.

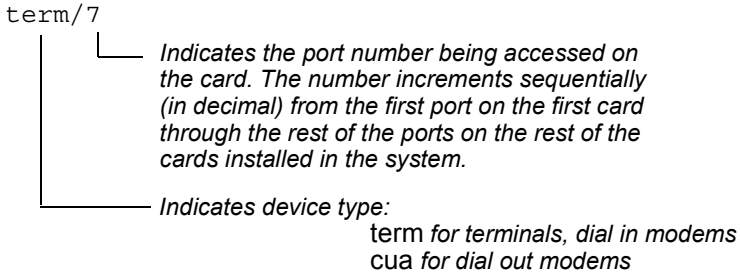
term/7
Indicates the port number being accessed on the card. The number increments sequentially (in decimal) from the first port on the first card through the rest of the ports on the rest of the cards installed in the system.
Indicates device type:
term for terminals, dial in modems
cua for dial out modems

FIGURE 3. Assigning Device Filenames

In this example, the terminal device for the port labelled *3* on the second 4020P card is accessed by the `term/7` device file.

TABLE 4. Solaris asynchronous device file names for two Apollo Multiport 4020 cards installed on the same system

Port Label	Async Terminal (Dial-in Modem)	Async Modem (Dial-out)
Apollo Multiport 4020P card in slot 1		
0	/dev/term/0	/dev/cua/0
1	/dev/term/1	/dev/cua/1
2	/dev/term/2	/dev/cua/2
3	/dev/term/3	/dev/cua/3
Apollo Multiport 4020P card in slot 2		
0	/dev/term/4	/dev/cua/4
1	/dev/term/5	/dev/cua/5
2	/dev/term/6	/dev/cua/6
3	/dev/term/7	/dev/cua/7

Setting Up Asynchronous Port Services

Once your peripherals are connected and the Aurora software packages are installed, the next step is to set up the appropriate port services for each peripheral.

Solaris has a number of tools available for administering port services. You should familiarize yourself with the man pages on `sacadm`, `pmadm`, `ttyadm`, and `lpadmin` before attempting to connect peripherals to the Aurora serial ports.

SunSoft also provides the window-based Admintool, which can simplify many tasks. However, in some cases they may not provide sufficient control over communications parameters to allow you to optimize the performance of your peripheral. For example, if you decide to use Admintool:Printers to set up printer services, you will find that you can’t vary the baud rate.

In this section we do not address the use of Admintool; we simply provide command line examples. If you want more information, refer to your SunSoft documentation

Setting Up Printer Services

Setting up printer service in Solaris requires the `lpadmin`, `accept`, and `enable` commands. The following example sets up a printer named `testlp` on port 0 running at 38,400 baud.

```
system% lpadmin -p testlp -v /dev/term/0 -T \
hplaserjet -D "testlabel" -o nobanner -o \
"stty='38400 cs8 -parenb -cstopb -crtscts ixon \
tabs'"
system% accept testlp
system% enable testlp
```

Refer to your printer manual for details on how to set its transmission characteristics (baud rate, bits/char., parity) and flow control (software/hardware).

Refer to your Solaris documentation for more information about using Admintool and setting up printer services.

Setting Up Terminal Services

Setting up terminal service in Solaris requires the `sacadm` and the `pmadm` commands. The following example sets up a typical terminal.

To set up services for a typical terminal

1. Create a new port monitor using `ttyaur0` as the `PMTAG` name:

```
system% sacadm -a -p ttyaur0 -t ttymon -c \
/usr/lib/saf/ttymon -v 1
```

If you get the message `ttyaur0 already exists`, it simply means that someone has already created `ttyaur0`.

To avoid anomalous behavior resulting from known Solaris defects, you must select a unique `PMTAG` name for every 16 Aurora ports (in other words, a unique name for each expansion unit you have.) While you are free to use whatever names you wish, Aurora recommends using PMTAG names of the form `ttyaur0`, `ttyaur1`... In any case, it is important that you *not* use a name of the form `ttymon`***xx*** as the PMTAG name.

2. Check the status of the port monitor:

```
system% pmadm -l                    (note lowercase L)
```

3. Remove the existing service (`ttymon0`) from the port to be administered (in this case port 0):

```
system% pmadm -r -p ttymon0 -s 0
```

If the Aurora board is the only serial device using `ttymon0` as a PMTAG name, you can remove the services from all ports by typing:

```
system% sacadm -r -p ttymon0
```

4. Start a port monitor service for a specific port (in this case, a Wyse 50 terminal running at 38.4 Kbps on port 0)

```
system% pmadm -a -p ttyaur0 -s 0 -i root -fu -v1 \
-m "`ttyadm -c -d /dev/term/0 -l 38400 \
-s /usr/bin/login -m ldterm -T wyse50 -S n`"
```

5. Repeat steps 2–4 to set up other terminal ports.

Refer to your terminal manual for details on how to set its transmission characteristics (baud rate, bits/char., parity) and flow control (software/hardware).

Refer to Solaris documentation for more information about using Admintool and setting up terminal services.

Bypassing the Carrier Detect (CD) Line

If you are using 3-wire cabling (or for some other reason the CD line will not be pulled high), you must bypass the CD line for terminal and printer ports. This is done by instructing the driver to assume the CD line is high regardless of its actual state.

The easiest way to do this is using Admintool. Browse the serial ports, select the appropriate port, and edit the port service by checking off the Software Carrier option on the Admintool:Modify Serial Port dialog box (click on Detail: More to display this option).

Alternatively, you can make the driver assume the CD line is high by typing

```
system% /opt/AURAase/ttysoftcar -y <device>
```

The notation ***<device>*** represents the given device file name, for example, `/dev/term/0`. Refer to "Asynchronous Device File Names" on page 4-2 for details on device file names.

To restore the CD line to its normal, driven state, type

```
system% /opt/AURAase/ttysoftcar -n <device>
```

You can query the state of the software carrier by typing

```
system% /opt/AURAase/ttysoftcar <device>
```

If you need to bypass the CD line from a C program, open the port using the `O_NDELAY` flag, and issue the following `ioctl` call:

```
int val=1;
ioctl(fd, TIOCSSOFTCAR, &val);
```

Do not bypass the CD line on serial ports connected to modems.

Setting Up Modem Services

Setting up modem service in Solaris requires the `sacadm` and the `pmadm` commands. The following example sets up a typical bidirectional modem.

To set up services for a typical bidirectional modem

1. Create a new port monitor using `ttyaur0` as the `PMTAG` name:

   ```
   system% sacadm -a -p ttyaur0 -t ttymon -c \
   /usr/lib/saf/ttymon -v 1        (note numeral 1)
   ```

   If you get the message `ttyaur0 already exists`, it simply means that someone has already created `ttyaur0`.

   To avoid anomalous behavior resulting from known Solaris defects, you must select a unique `PMTAG` name for every 16 Aurora ports (in other words, a unique name for each expansion unit you have.) While you are free to use whatever names you wish, Aurora recommends using PMTAG names of the form `ttaur0`, `ttaur1`... In any case, it is important that you *not* use a name of the form `ttymon`***xx*** as the PMTAG name.

2. Check the status of the port monitor:

   ```
   system% pmadm -l                (note lowercase L)
   ```

3. Remove the existing service (`ttymon0`) from the port to be administered (in this case port 0):

   ```
   system% pmadm -r -p ttymon0 -s 0
   ```

4. Start a port monitor service for a specific port (in this case, a bidirectional modem running at 38.4 Kbps):

   ```
   system% pmadm -a -p ttyaur0 -s 0 -i root -fu -v 1 \
   -m "`ttyadm -b -d /dev/term/0 -l 38400 \
   -s /usr/bin/login -m ldterm -S n`"
   ```

5. Now, add the modem to the `/etc/uucp/Devices` file using the following format:

   ```
   ACU cua/0 - 38400 <type>
   ```

   where *<type>* is either a built-in function (`801`, `Sytek`, `TCP`, `Unet-server`, `DK`) or one whose name appears in the `/etc/uucp/Dialers` file (`hayes`, `tbfast`, etc.).

6. Repeat steps 2–5 for other modem ports.

Refer to your modem manual for details on how to set its transmission characteristics (baud rate, bits/character, parity) and flow control (software/hardware).

Refer to your Solaris documentation for more information about using Admintool and setting up modem services.

Setting Asynchronous Data Rates

Aurora recommends that you use the SunSoft Admintool or Solaris `stty` command to set baud rates for asynchronous ports. See the Admintool documentation or the Solaris `stty(1)` man page for information on how to do this.

CHAPTER 5

Using Vanguard Multiport Software

Aurora Technologies device driver software delivers advanced features for unparalleled flexibility and convenience. These features are described in the following sections:

- Viewing Port Parameters with aseinfo
- Administering ports with mset

Viewing Port Parameters with aseinfo

The `aseinfo` command allows you to view the current status of your expansion ports.

To use `aseinfo`, you must first

- Log in as root
- Change to the `/opt/AURAase` directory

The syntax for `aseinfo` is

```
system# ./aseinfo [-ports] | [-drivers]
```

To view the port parameters

1. Type

   ```
   system# ./aseinfo -ports | more
   ```

2. Scroll through the listing using the space bar.

To view the active drivers

1. Type

   ```
   system# ./aseinfo -drivers | more
   ```

2. Scroll through the listing using the space bar.

See Figure 4 on page 5-2 for sample output from `aseinfo`. In that example, two Apollo 4020P cards are installed in the system.

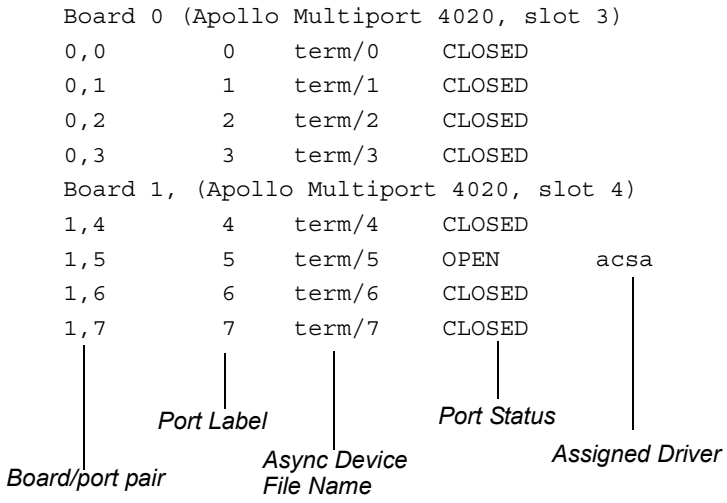

FIGURE 4. Output from the aseinfo command

Administering Ports with mset

The `mset` utility can be used to reset hung ports, check the error statistics for the asynchronous lines in use, and to set higher baud rates.

mset Command Options Summary. The command format for `mset` is

`mset <`*`device_name`*`> <`*`option`*`>`

where

<*device_name*> is the device name

<*option*> is one of the command options listed in Table 5.

TABLE 5. mset Options

mset Option	Description
-<*baud_rate*>	Sets BAUD rate for given port.
-baud <*baud_rate*>	Sets BAUD rate for given port.
`-dtrflow`	Configures the driver to use DTR (pin 20) as the input hardware flow control pin. The DTR pin will function like RTS (pin 4). The RTS pin switches its function to act like DTR. (Not available in ASE driver)
-ext	Sets port BAUD rate to external clock.
-flush	Resets a hung port.
`-rtsflow`	Configures driver to use RTS (pin 4) as the input hardware flow control pin (see -dtrflow above). (Not available in ASE driver)
-show	Reports the current settings of the custom baud rate, input hardware flow control pin, and close timeout for the specified port.
`-stats`	Reports error statistics for the specified asynchronous port. **Note:** -statsr reports the same information as -stats and additionally resets each field to zero.

TABLE 5. mset Options

mset Option	Description
`-statschk`	Reports a list of board/port numbers that have detected receiver overruns, frame errors, parity errors, or dropped characters.
-statsreset	Resets all errors and statistics for all ports.
-std	Sets port Baud rate to 38400 bps.
-timeout	Sets the time that the driver will wait during a close before forcing the close to complete if the close is waiting on transmit data. The default time is 15 seconds. (Not available in ASE driver)

CHAPTER 6

Troubleshooting

This chapter describes problems you could possibly experience with your Apollo Multiport card and the actions you should take to diagnose and solve those problems. Topics covered in this chapter include:

- Resolving installation problems
- Clearing hung Async ports
- Using the xxtrace Driver Tracing Utility
- Troubleshooting with mset
- Calling for support

Installation Problems

If you experience problems immediately after the installation of your Apollo Multiport card, check the following:

- Is the peripheral cable the correct type? If it is a null-modem cable is it the right kind of null-modem cable? The vast majority of problems are due to incorrect cable selection. Refer to Appendix A, *Cables and Connectors.*

- Are any connections to other boards loose?
- Is the PCI card properly seated in the system?
- Is the power cord loose in the wall socket or at the connection to the system unit?
- Are the external equipment connections made properly?
- Is the equipment powered on?
- If you're experiencing interference are you using properly shielded cables? Make sure that the cabling is not running near a power source; if it is try moving the cabling to a new location.
- Is the cable length correct?

  The RS-232 cable specification is 100 feet (30.5 m) at 9600 bps.

If everything on the list is OK, remove

- all Apollo Multiport software (see installation chapter for your operating system)
- the Apollo Multiport card (see your CompactPCI-based system hardware documentation for instructions).

Now bring up your system to determine whether it operates correctly without the Apollo Multiport card installed.

If your system operates correctly, the problem may be with the Apollo Multiport card. If your system does not operate normally, the problem is most likely with the system.

Clearing Hung Async Ports

Asynchronous ports may occasionally hang due to a number of factors. If this occurs try some of the suggestions here. If all else fails, reboot your workstation.

To clear a hung async port

1. Switch user to root:

   ```
   system% su
   Password: <root_password>
   system#
   ```

2. Run `ps` to get the process number for the program that has the port open:

   ```
   system# ps
   ```

3. Use `kill` to remove the offending process:

   ```
   system# kill -9 <process_number>
   ```

   This should free up the port. If it doesn't, the process may be defunct. Use the appropriate procedure below to remove a defunct process from a port.

To clear a defunct process on port cua/8

1. Switch to the `AURAase` directory

   ```
   system# cd /opt/AURAase
   ```

2. Use the `mset` command to clear the port.

   ```
   system# ./mset cua/8 -flush
   ```

Never use the `mset -flush` command on a functioning port. Loss of data will result.

The xxtrace Driver Tracing Utility

If you are having problems with your Apollo Multiport card, a service representative may ask you to take a trace of your problem. This section describes the steps of getting a driver trace.

Using xxtrace Commands

Table 6 contains a summary of the `xxtrace` commands.

TABLE 6. xxtrace Command Summary

xxtrace Command	Description
ld	Loads the Apollo Multiport driver (async)
ul	Unloads the Apollo Multiport driver (async)
xa	Enables tracing on all ports
xb *n:p*	Enables tracing on a specific board/port
xc	Clears the trace buffer and restarts tracing, keeping the same ports and events active
xp	Dumps the contents of the trace buffer out of memory and prints it to stdout
xr	Clears the trace buffer and shuts off tracing
xs	Shows the current port(s) and events being traced

Running xxtrace

To run xxtrace

1. Log in as root

You must be logged in as root in a `csh` environment to run this test.

2. Change to the appropriate directory:

```
system# cd /opt/AURAase
```

3. Enter the following:

```
system# source sourceme
```

4. Enable tracing by entering one of the following:

To enable tracing on *all* ports, type

```
system# xa
```

To enable tracing on a *specific* port, type

```
system# xb n:p                    ( n and p are in hexadecimal)
```

where *n* is the board number in the system starting with 0, and *p* is the port number, starting with 0.

For example, `xb 0:3` turns on tracing for the prt labeled 3 on the first Aurora card in the system.

5. To show that tracing is turned on, type:

   ```
   system# xs
   ```

   The system displays a list of all the trace points.

6. Reproduce the situation that was occurring when you encountered the problem.

7. *As soon as* the failure condition occurs (to avoid overwriting any buffers), dump the contents of the trace buffer out of memory and print it by typing:

   ```
   system# xp
   ```

   This command prints data to standard output. You can redirect the contents to a file, using this format:

   ```
   system# xp > /tmp/filename
   ```

   where **<*filename*>** is the name of the redirected output file in the `/tmp` directory.

8. Find out how many lines the trace output is by doing a **`wc -l`** on the file.

   To clear the trace buffer and restart tracing, keeping the same port(s) and events active, enter

   ```
   system# xc
   ```

   If the output is not very long, FAX it to us. Otherwise, tar it to a diskette or CD and send it to Customer Service and Support. Also you may compress, uuencode, and e-mail it to

   ```
   support@auroratech.com.
   ```

To make the system operational again

1. Clear the trace buffer and shut off tracing:

   ```
   system# xr
   ```

2. Now reboot the system:

   ```
   system# reboot
   ```

Troubleshooting with mset

You can run `mset` when you are receiving data corruption errors on incoming data, such as

- Receiver Overruns: This occurs when the chip's FIFO is full, more data has arrived, and the system could not respond to the interrupt fast enough.
- Frame Errors: The data received was missing a stop bit.
- Parity Errors: The parity check was wrong.
- Dropped Characters: The OS did not have enough memory to handle the incoming data.

To run mset

1. Log on as root
2. Change to the appropriate directory:

   system# **cd /opt/AURAase**
3. Type the following:

   system# **./mset <*device_name*> -statschk**

   This prints a list of board/port numbers that have detected receiver overruns, frame errors, parity errors, or dropped characters. The output looks similar to the following:

   ```
   The following channels have detected errors:
   Board 1, port: 3, 4
   Board 2, port: 2
   ```

   This indicates that the port labeled "3" and the port labeled "4" of the first board has detected errors and the port labeled "2" on the second board has detected errors.
4. To report the error statistics for the specified asynchronous port, enter:

   system# **./mset <*device_name*> -stats**

   This example shows 5 characters received with parity errors. It also shows that the port received 3021 characters and transmitted 21 characters.

   ```
   receiver overruns:            <0>
   receiver frame errors:        <0>
   receiver parity errors:       <5>
   receiver chars dropped:       <0>

   received chars:               <3021>
   transmitted chars:            <21>
   ```

5. To reset all errors and statistics for all ports, enter:

```
system# ./mset <device_name> -statsreset
```

To report error statistics and reset all errors and statistics per port, you could have entered the following in Step 3:

```
system# ./mset <device_name> -statsr
```

mset Error Message

```
cannot open device
```

The device specified in the message line cannot be opened by `mset`. This could be due to permissions on the device, or the driver is not loaded, or that device actually doesn't even exist. This could also mean that the device name is not specified properly.

Calling for Support

If you need to call Aurora Technologies' technical support for help, make sure that you have completed the following checklist:

Support Call Checklist

1. Serial Number: _____

   (found in the back of this manual, on the hardware, and on the shipping container)
2. CompactPCI-based system model number: _____
3. SunOS/Solaris version: _____
4. List all peripherals connected to the Apollo Multiport card.
5. Apollo Multiport software driver version: _____

   (The version number is printed on the driver software media and is displayed when installation is completed.)
6. List the cable pinout description.
7. Verify the type of cables used. (modem, null-modem, etc.)

Telephone support is available Monday through Friday, 8:30AM to 6:00PM Eastern Time.

CHAPTER 7

Warranty & Maintenance Information

Warranty on Hardware & Software

Aurora products carry the following standard warranties:

Standard Hardware Warranty Policy

All Aurora hardware products are warranted against defects for two (2) years from the date of delivery. The Standard Warranty includes 90 days of free Technical Support, two (2) years product repair, and driver upgrades.

Standard Software Warranty Policy

Aurora warrants that the physical media on which software is furnished will be free from defects in materials and workmanship, under normal use, for a period of (90) days from the date of shipment.

The Standard Warranty includes 90 days of Free Technical Support.

Make sure you complete the Warranty Registration form on page 7-2 and return it to Aurora Technologies. Refer to Warranty information at www.auroratech.com for details on extended warranty plans.

AURORA TECHNOLOGIES

Product Registration Form

Important! Please print, complete, and return this Product Registration Form to Aurora's Customer Service and Support (CSS) Department at 508-588-0498. The information you provide here allows CSS to validate your warranty and inform you of software and hardware upgrades.

Purchase Order No.:_____**Sales Order No**.:_____**Serial No.**:_____

Name/Title:_____

Company:_____

Street Address:_____

City:_____State:_____ Postal Code:_____

Country:_____

Phone:_____Fax:_____

Email Address:_____

Supplier Name:_____Date Purchased:_____

Supplier Address:_____

City:_____State:_____ Postal Code:_____

Country:_____

Supplier Phone:_____

Protocol/Software License Application

Product: ❑ X.25 ❑ HDLC ❑ Control Tower Version:_____

Workstation Type:_____ O/S Version:_____ Host ID:_____

Maximum Number of Ports:_____

Your Application

❑ Printer/Plotter Connectivity
❑ Internet Connectivity
❑ Terminal/Instrumentation I/O
❑ Telecom Service Provider
❑ Modem Pool
❑ Data Feed
❑ WAN Connectivity
❑ Other

Aurora Technologies, Inc. - 10 Mupac Drive Brockton, MA 02301 - USA
Phone: 508-588-6110 - Fax:508-588-0498 - E-mail: support@auroratech.com - URL: www.auroratech.com

Appendix A

Cables and Connectors

This appendix provides information about how to make physical connections to serial ports. It discusses modem and null modem connectors, the standard RS-232 pinouts, and describes some typical cables.

Two terms used frequently in this appendix are

- Data Communications Equipment (DCE)
- Data Terminal Equipment (DTE)

The term *DCE device* usually refers to a modem. *DTE devices* include terminals, printers, and computers.

Cabling Overview

To connect a peripheral device to an Aurora Communications Controller, you need a break-out-box or octopus cable and an interface cable. The break-out-box or octopus cable connect directly to the multiport controller card. The interface cable runs the electrical signals from one of the DB-25 or RJ-45 connectors of the break-out-box or octopus cable (DB-25 only) to the device. Since we cannot determine in advance which of the many types of cable you may need, Aurora does not supply

this cable. You can purchase ready-made cables from Aurora Technologies or at your local computer store.

DCE and DTE devices send and receive signals through different pins. Aurora's controller cards are configured as DTE devices. In general, when connecting a DCE device to a controller card, use *modem* (or straight-through) cables. For DTE devices, such as terminals and printers, use *null-modem* cables.

Since difficulties with cabling account for most installation problems, this appendix describes the different types of cables to use. You should check the design of the cables you buy against the cables defined in this chapter to verify that you have the correct cables.

Serial Connector Pinouts

Terminals, modems, and printers typically communicate through an RS-232 (serial) interface. All of Aurora's DB-25 and RJ-45 connectors are DTE type RS-232 compatible serial connectors.

Figure 5 shows the location of the RS-232 pins supported by the controller cards.

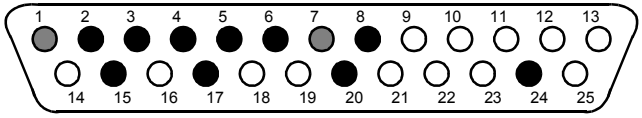

FIGURE 5. DB-25 Serial Connector Pin Diagram (male DTE)

Table 7 shows the connector pinouts for both synchronous and asynchronous devices. Pins 15, 17 and 24 are used exclusively for synchronous transmission.

TABLE 7. Serial Connector Pinout

Pin Number	RS-232 Signal	V.24 Signal	Direction
1	Chassis GND	102	None
2	TXD	103	Output
3	RXD	104	Input
4	RTS	105	Output
5	CTS	106	Input
6	DSR	107	Input
7	Signal GND	–	None
8	DCD	109	Input
15	TxC_{in}	114	Input
17	RxC_{in}	115	Input
20	DTR	108/2	Output
24	TxC_{out}	113	Output

Signal Descriptions

Table 8 provides a description of each signal on the serial connector.

TABLE 8. Pin Signal Descriptions

Signal	Description
Chassis GND	Chassis (Earth) Ground. Prevents static discharge.
TXD	Transmit Data. Sends data to peripheral device.
RXD	Receive Data. Receives data from the peripheral.
RTS	Request to Send. Signal asking if peripheral device is ready to receive data.
CTS	Clear to Send. Signal from the peripheral device indicating readiness to accept data.
DSR	Data Set Ready. Indicates the remote device is ready to communicate.
Signal GND	Signal Ground. Provides reference level for other signals.
DCD	Data Carrier Detect. Signal indicating that the peripheral device has detected a signal from the remote peripheral device over the telecommunications channel.
RxC_{in}	Receive Data Clock. Input for receiver signal element timing from a synchronous, DCE device.
TxC_{in}	Transmit Data Clock. Input for transmitter signal element timing from a synchronous, DCE device.
DTR	Data Terminal Ready. Indicates the local device is ready to communicate.
TxC_{out}	Transmit Data Clock. Output for transmitter signal element timing generated on synchronous multiport controller cards.

Asynchronous Serial Cables

This section first describes modem cables, which are typically used to connect modems to the controller card. Next, it describes null-modem cables which are typically used for other peripherals such as terminals and printers.

Asynchronous Modem Cables

Modem cables are designed to connect devices that send and receive data on different pins, which is the case when connecting a DCE device to a DTE device. In a serial modem cable, the pins in the connectors are wired straight-through: 1-1, 2-2, 3-3, and so on.

Each port on the Aurora cable or breakout box is configured as a DTE device. To connect modems and other DCE devices to the card, use a *modem* cable with appropriate connectors (DB25 or RJ45.) You can obtain the correct cable from Aurora Technologies or your local computer store.

Figure 6 shows the wiring of an asynchronous serial modem cable that enables the card to communicate with the modem. For a listing of the signal names of the pins, see Table 7 and Table 8 in the preceding section.

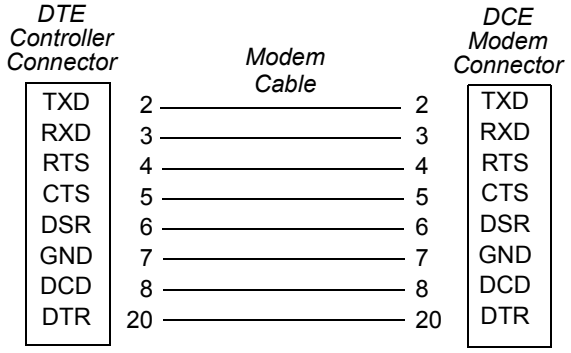

FIGURE 6. Asynchronous Modem Cable (DTE to DCE)

Asynchronous Null-Modem Cables

Consult your device manual to determine the type of null-modem cable that is required. Note that all three cables shown here can support XON/XOFF software flow control since pins 2, 3, and 7 are wired the same way.

Null-modem cables are designed to connect devices that send and receive data on the same pins, which is the case when you connect a DTE device to another DTE

device. Because both devices are trying to send and receive on the same pin, the wiring of the cable must swap those signals.

Since the Aurora controller cards are configured as DTE devices, you must use a null-modem cable to connect them to other DTE devices such as terminals, printers, and plotters.

Other signals in the RS-232 specification have the same requirements and, depending on your peripheral, may have to be swapped also. Therefore, there are several different types of null-modem cables available. Three of the most common ones are

- XON/XOFF
- Request-To-Send (RTS)
- Data Terminal Ready (DTR)

The difference among the three cable types is the flow control they support:

- XON/XOFF supports software flow control only, with its three-wire configuration for XON/XOFF handshaking (see Figure 7).
- RTS supports hardware handshaking when the peripheral uses the *Request To Send* (pin 4) signal
  (see Figure 8).
- DTR supports hardware handshaking when the peripheral uses the *Data Terminal Ready* (pin 20) signal (see Figure 9).

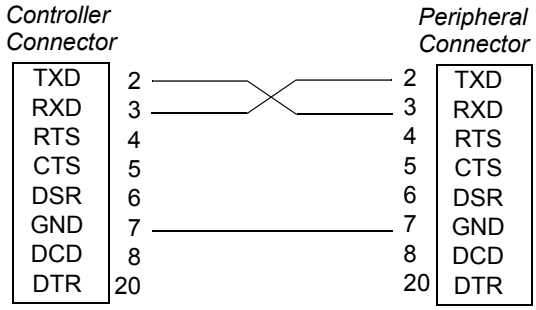

FIGURE 7. Asynchronous Null Modem Cable (XON/XOFF Handshaking)

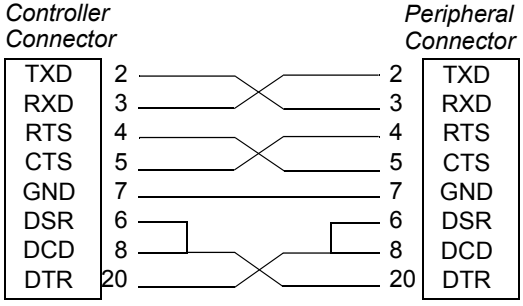

FIGURE 8. Asynchronous Null Modem Cable (RTS Handshaking)

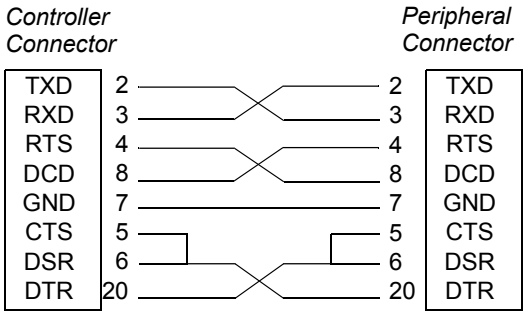

FIGURE 9. Asynchronous Null Modem Cable (DTR Handshaking)

Figure 10 shows how to make an RJ-45 to DB-25 null modem connection.

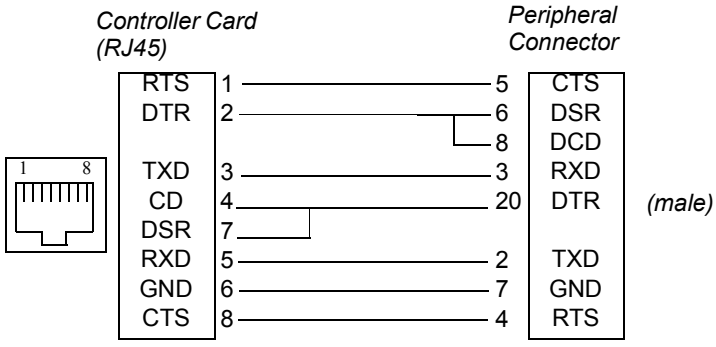

FIGURE 10. Asynchronous RJ45-to-DB25 Null Modem Adapter (Out-of Band Flow Control)

Synchronous Serial Cables

For successful synchronous cabling, you must carefully consider what pins your clock signals are on. You must ensure that there is a single clock source for both the transmitter and receiver of data.

Connecting Synchronous Modems

Since all clock signals are brought out on their standard pins, you can use the straight-through modem cables shown in Figure 11 to connect synchronous modems to the multiport controller card. No adaptors are necessary.

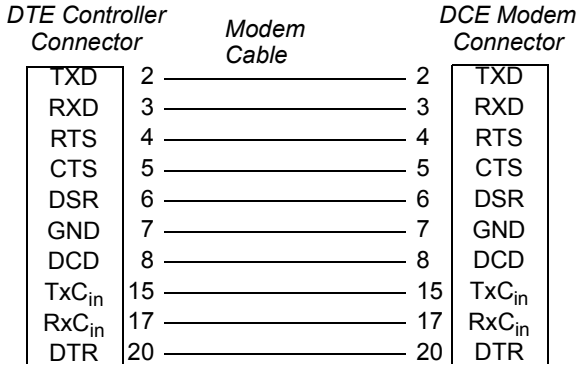

FIGURE 11. Straight-through synchronous modem cable

Connecting Other Synchronous Devices

Figure 12 shows the null-modem cable design for connecting the multiport controller card to synchronous DTE devices.

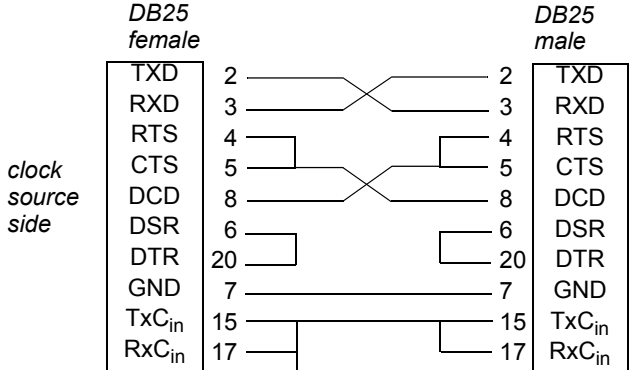

FIGURE 12. Synchronous Null-Modem Cable

Note that this is a general purpose synchronous cable that can be used for other, non-Aurora ports.

Connecting Peripherals

Each port on the expansion unit has a male DB-25 connector. You must supply cabling that connects your peripheral devices to the DB-25 connectors on the Expansion unit. Depending on the required interface, you may need to use an adaptor.

For example, if you are using an RS-449 interface, you will need a 25-pin to 37-pin adaptor to connect the multiport controller card's DB-25 output to the DB-37 connector specified by RS-449. This adaptor would be wired with respect to the pinout shown in Figure 14.

RS-232 Functional Pinout

Aurora's multiport controller cards support the RS-232 compatible functions shown in Figure 13. These signals allow reliable asynchronous and synchronous communications.

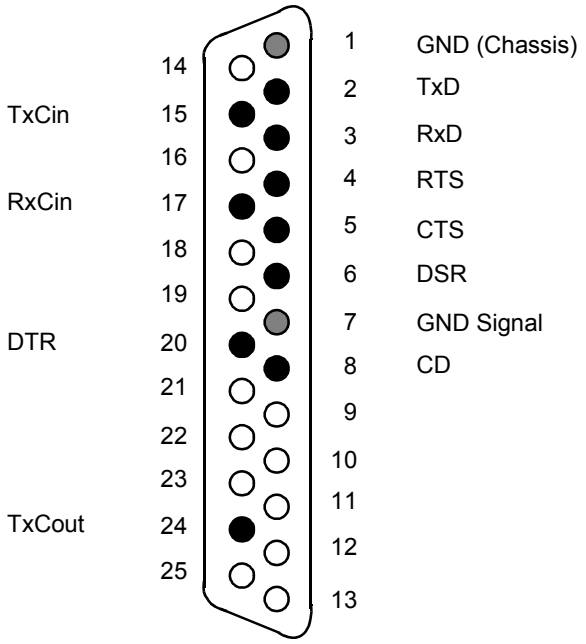

FIGURE 13. RS-232 Interface Signals Transmitted through the DB-25 Connector Pins

RS-422 and RS-485 Support*(optional)*

Since RS-422 and RS-485 are electrical specifications only, they can be supported over many connectors. The multiport controller cards support them over its DB-25 output connectors using the functional pinout shown in Figure 14.

Both RS-422 and RS-485 specify balanced electrical operation. The main difference between the two specifications is that RS-485 allows multipoint connections

where RS-422 is point-to-point only. Note that EIA-530 refers to RS-422 for its electrical specification.

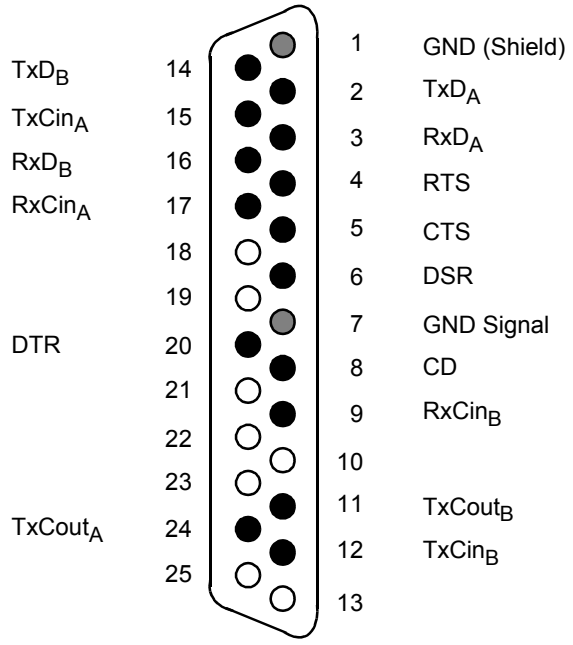

FIGURE 14. Signals Transmitted through the DB-25 Connector Pins for RS-449 and 485

Appendix B

Product Information Worksheet

Completing Product Information Worksheet

Record the following information about your Aurora Apollo Multiport card and your computer system.

Apollo Multiport card serial number: _____

Computer system model: _____

Operating System version: _____

PCI interface card installed in slot number: _____

Peripheral/Port assignments:

Slot	Port	Peripheral
	0	
	1	
	2	
	3	

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